

**Saving EDP
\$\$ With
the 360/25
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COMPUTERWORLD

The Newsweekly for the Computer Community

**Record IBM
Earnings
Page 7**

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First 360/25 Is Ordered On Its Announcement Day

MUNDELEIN, ILL. - One of the first companies to use IBM's new System/360 Model 25 will be the Decorel Corp., multi-plant manufacturer of picture frames and decorative housewares. The system, scheduled for delivery in the first quarter of 1969, is expected to perform the company's data processing jobs up to 50% faster.

First Day Order

Decorel president and chief executive Stuart R. Scheyer signed the order for the Model 25 on the day the product was announced.

"We expect the Model 25 will enable us to perform our current data processing jobs up to 50% faster," he said. "The time we save over present methods, using an IBM 1440 computer, will be of direct benefit to our customers and to our management procedures."

Mr. Scheyer said the key element in the company's decision was the logical growth path the 360 offers a growing firm like Decorel. "We expect our need for data processing will match the growth of the Decorel Corp.," he said. "With the System/360 we can meet that need one logical step at a time."

Replacing 1440

The first task of the Model 25 will be to pick up the accounting and manufacturing control applications now being processed on Decorel's 1440 computer.

Univac 9400 Said 2X As Fast As IBM 360/30 At Same \$\$s

BLUE BELL, PA. - Univac today announced a competitor for the 360 Models 25 - 30 which is priced at approximately 360/30 prices - but is between 2.5 and five times faster internally. It also has hardware features directly designed to help with real time and remote operations. These features include a doubling up of the registers so that the operating system has registers separate from those of the problem program.

Subset of 360 Codes

The new system, to be delivered in the second quarter of 1969, uses a machine code which is practically a subset of the standard IBM 360 code. However, unlike previous subsets, such as those used in the 360/20, the Univac 9200 and 9300 and the RCA Spectra 70/15 and 25, it has almost half the instruction repertoire of the Model 30 - more than adequate to make up a powerful system. The 44 floating point instructions not normally used in business operations have been omitted. Effectively, the use of this large subset means that a programmer trained in the 360 code will have no difficulty in understanding the new machine codes.

Software includes an operating system which can handle a five-way



A view of the newly-announced Univac 9400 system shows the Univac built disk drives which are a feature of the system.

multi-programming, Cobol, Fortran and RPG. Software delivery schedules have not yet been set but they will allow for maximum compatibility with their 360 equivalents.

New Disk Drives

Included in the compatibility is the provision for a complete new set of 2311-equivalent disk drives. Univac

has not previously had any such units - the most popular peripheral added to computers in recent years. With the announcement of the 9400 they have added exact functional copies of the 2311s - same format, same access - to their 9000 product line. For a new twist, they are offering "format" compatibility. This means that for perhaps the first time, disk packs written on an IBM system will be able to be read on the competition. This is not a simple problem at it involves both hardware and software. At present, there is even format incompatibility between different operating systems and different languages on the IBM line.

Mr. Frank McPherson, project manager for the 9400, told COMPUTERWORLD that the system was not an attempt to just turn people around who are presently using the 360/30. "The 9400," he said, "is

much better for real time and equivalent operations than the 360/30 and 40; and we are offering it to those uncommitted users, to present users of the model 20 and our own 9200, 9300 systems who want to step up. We believe it offers a really good opportunity for people to enter into the modern computer realities. Some of our more aggressive salesmen no doubt will use it to turn around Model 30s - but that is not our intention."

9500 - Still No Plans

Asked about the position of the 9500, Mr. McPherson said that at present Univac has no immediate plans to market the 9500. Although this was previously announced along with the 9200, 9300, it has since been determined that there was a much larger market available for a slightly smaller machine - and this is the target of the 9400.

Entering Supply Market

New Honeywell Disk Packs To Be Sold To All Users

Honeywell's EDP Div. entered the competitive computer supplies market this week with an announcement of their new Disk Pack line. Allen Ruddell, vice president, Administration, told COMPUTERWORLD that the new step would take the corporation into IBM computer rooms across the country, just as the 1963 announcement of the Honeywell 200 system did. With this step, the corporation joined a number of other firms who are currently offering disk packs for general use and, like them, set their prices at the IBM level.

The Honeywell disks are 2311 compatible, and are being offered through a special sales force, as well as through the standard EDP sales operation. Rental terms are offered, and it can be expected that they will usually be rented as then all problems of repairs, maintenance, etc., fall on Honeywell rather than on the user. The prime advantages of the system from the user's point of view are expected to be the availability of second source of supply, often required by purchasing departments, having the full computer-knowledge of Honeywell behind it; and improved delivery over what IBM has to offer.

Other products are apparently going to follow the disk packs. These will be offered by the special sales force which, while currently small, is to be built up during the year under the Supplies Division. Pictures of the new production line, and details on the present status (along with the other non-IBM disk pack suppliers) of price, delivery, etc. are given on Page 5 of this issue.



Honeywell's new production facility for disk packs include this equipment for balancing the packs.

Adapso Appealing Court Ruling In Its Bank Data Processing Suit

New York, N.Y. - The Association of Data Processing Service Organizations (ADAPSO) has authorized its attorneys to file an immediate appeal to overturn an adverse decision handed down in its bank litigation suit against the U.S. Comptroller of the Currency and the American National Bank of St. Paul, Minn.

A federal district court in St. Paul dismissed the suit brought by ADAPSO which challenged the legality of a 1966 ruling by the Comptroller of the Currency, allowing national banks to perform data pro-

cessing services to other banks and bank customers.

In announcing ADAPSO's intention to appeal the ruling, executive vice president Jerome L. Dreyer said, "This does not, however, mean that the court sanctioned the conduct of the banks in this case, but on a point of law concerning standing, the organizations bringing suit to defer the banking industry from illegally marketing EDP services were deemed not the appropriate litigants. A reversal of this decision will pro-

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Editorials

Computers And The Stars

If there was one area where computers were not expected, it was the eternal world of the stars. Particularly, their relationship to humans. Astrology, although popular with many, has produced few scientific research programs. It did not appear that computers could help in developing anything of interest to the ladies who tell fortunes on seaside piers, or to their more sophisticated colleagues in large metropolitan centers.

Starting with computers, using the precise pattern of the stars at the moment of birth, you can economically produce not just a short horoscope — but a much more lengthy and detailed one! The computer is an ideal medium for obtaining astrological guidance economically. The computer can also help, apparently, in checking out astrological theories — comparing observed phenomenon against the sometimes ambiguous translations of medieval manuscripts. In short, computers can help in the development of astrology.

Never underestimate the applications of a computer.

The Problem Is The Past

Computer systems analysts, when designing new systems, are accustomed to dealing with the future. They plan in detail what the effect of their changes will be on the people who will have to work with them. They check, and double check, not merely that the operation will do what it is supposed to do, but also how it will affect the overall workings of a company, university, government agency or what have you. And, generally, as a result of all this work, the system works well. Analysts are becoming experts at looking into the future.

Sometimes, however, the problem is not in the future — but in the past. This appears to be particularly true with the privacy issue.

It is not, in fact, the new records that might be established by a possible national data base that are frightening people — it is the potential abuse of the existing records being collected every day.

This, then, is the problem of the past. As computers become more sophisticated they have to face up to the fact that there are areas where the legacy of what has already happened may pose almost insurmountable problems. It should be part of the training of computer managers to learn how to recognize and live with them.

A Quiet Plea

1968 is election year — and election year means that computers will be in the headlines. If you are involved — please try to see that supernatural powers are NOT ascribed to them. Thank you.

COMPUTERWORLD

The Newsweekly for the Computer Community

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Two Steps Per Decade Is Not Enough (In Fact - It's About 80% Short!)

In 1959 IBM introduced the 1401. In 1968 they introduced the 360/25. Between these two dates the most amazing changes had taken place in the use of computers for commercial purposes. However, from the point of view of the ordinary business user only a single major change had occurred — the advent of the 360 in 1964. From his point of view the price/performance

offered in 1959 was still only slightly out-of-date.

In this article it is suggested that the "family" concept of computers results in effectively changing the price/performance plateau only once every five years, or approximately twice a decade. While this may be perfectly adequate for a specific computer installation, it is acting as a brake on the development of computer technology.

The family concept of computers took hold fast in 1964 when IBM announced the System/360. Upwards and downwards compatibility, some capability of running previous programs, seemed to be the answer to everything a data processing manager would need. It seemed to answer all the problems that had occurred in the conversion to the second generation systems. And it did it on the surface.

GE Led The Way

It was, of course, not new. GE, with their Compatibles, had led the way. Even so, there was nothing like the 360 family. From the users point of view it appeared to give the ability to move up or down and to invest confidently in programming — knowing that no matter what happened, you could run your systems on future computers.

Other Manufacturers Copied

The advantages were so obvious that all the other computer manufacturers copied the idea. That is to say, they copied it at least on the surface. Some of the "families" were not "families" but merely renamed systems. Sometimes they had no upwards and downwards compatibility. The concept was so popular that it became a requirement in many government specifications — notably the

Air Force Phase II — to provide this type of equipment.

After years have rolled on, it has become increasingly clear that there is a price to pay for the advantages of computer families. At the start it was not obvious that there was any cost involved. The manufacturer saved by having to produce only one set of external hardware specifications, one set of software, etc. The user saved by not having to change when 10-50% changes in his loading took place. The programmer saved because, by taking direction from one set of manuals, he could learn how to program many systems across the country. It certainly seemed a most desirable thing — an advantage without a flaw.

Flawed Concept

It has become apparent that there are some flaws in the concept. One of the major flaws, the one we wish to deal with today, became most apparent last week with the announcement of the new 360/25. This flaw suggests that the concept will effectively slow down the rate of technological progress. The enormous cash flow problems of the manufacturing companies appear to require that from the time a family is introduced until the time the next family is introduced, a "compatible" set of pricing characteristics must be maintained throughout the system.

Of course, some changes can be made. In the case of the 360, the two used Model 30, the Model 60, the Model 70 and Model 90 have all been replaced by other models which gave significantly better price performance. However, these are minor moves within the families. The new Model 65 did not undercut the old Model 70 market. The new Model 30 equally did not influence the marketing of the Model 40. It simply adjusted itself to the needs of immediate competition.

Giant Quantum Steps

What we are talking of here are steps — giant quantum steps. Insofar as the commercial user is concerned, in the last ten years there has only been one such step — the move from the 1400 to the 360's.

We can apparently expect no more until the fourth generation appears!

From the users point of view, and perhaps from the nation's point of view, the question is: can we afford to make only two steps per ten years? Perhaps an individual can — and perhaps an individual installation can — but can an entire technology?

COMPUTERWORLD does not pretend to know the answer — but, we are very disturbed by this implication of the "family" concept of computers.

Letters to the Editor

To the Editor:

I was at the first meeting of the Universal Computing Society and I want to compliment you on the fine evaluation of UCS in CW! [Dec. 13, 1967] I'm sure that it brought forth the inner feelings of most, although I have noticed a few hangers on (including the "Avenging Prophet") at the first "Executive Board Meeting." This was the Jan. 5 meeting. For the record, I dropped in late, and was told that I was voted in as a member of the Exec. committee. They published a newsletter, and within was a reprint of the article that you wrote. At this point, I realized what an idiot I was for even coming to these meetings of theirs, and I should be having lunch with the fellows shortly (mainly as repayment for a lunch which I bought them prior during the day of the big kick-off) to explain that I really can't afford to be associated with a group that is getting that kind of publicity. After a good examination, it is clear that Mr. Mann is looking for money, and is not interested in helping anyone but himself with the society. Well, so much for a lost cause.

I must also thank you for your reference to Brandon Applied Systems! [Dec. 6, 1967] I was in New York over the holidays, and dropped into their office late on the 29th. I took their test, and it was fabulous. It's much better than any I have seen. The first problems (there

are 5) took from 15 minutes to ½ hour. The last problem was a hum-dinger, and took 1 hour. My only suggestion to the author was that he include more testing on creative detail. Most of the detail in the test (of which there was plenty) was figuring out what the author had already done.

Henry N. Tarrson
Software Consultant
Evanston, Illinois

To the Editor:

I was very happy, but somewhat surprised, to see Everett D. Parker's comment in the January 3rd issue of COMPUTERWORLD regarding the percentage of Data Processing people and their corresponding knowledge of the subject.

Although I do not agree with him 100%, I strongly believe that a distinction must be made between the Systems Analyst, Data Processor, etc., who is concerned with the actual operation of the machine, and the man who plans the uses of the machine with little or no regard as to the electronic or programming gyrations which accomplish a job.

I also believe that it is the generalist who has the better understanding of the actual uses to which a computer can be put and who is not so concerned about what the machine can not do, as opposed to what it can do.

Parker's comment was very well accepted by me personally, not so much for its content, but because it dares to be different. It is only

through the expression of differences that man has ever advanced. Keep on being different!

Dennis A. Vihnanek
Systems Analyst
The Toni Company
Chicago, Illinois

To the Editor:

I noted with a great deal of interest your article, "Management — Biggest Problem for DP Managers!" appearing in your December 13th issue of COMPUTERWORLD.

I certainly concur with your observations and comments! I also have a further interest in the subject matter which you covered because of my own activities working with the International Data Processing Management Association. We have been conducting, on a national basis, a number of seminars on the subject of "How to Double Your Effectiveness with Half the Effort." These DPMA sponsored seminars are of a one-day duration and are specifically planned to further improve the managerial capabilities of Data Processing personnel.

The executive director of DPMA, Mr. R. Calvin Elliott, will also, I am sure, concur with your general philosophies.

I thoroughly enjoyed your material and hope that these ideas will continue.

John L. Marley
John L. Marley & Company
Management Consultants
Chicago, Illinois

Astrologers Prepare Better Horoscopes Using Computers



There cannot be many Directors of Research in astrological circles - but here is one. Katina Theodosiou, who holds that position with Time Patterns Research, is seen here with her favorite tool - a computer.

The sky's the limit to which computers are reaching these days. The millions of Americans who follow astrology with devout belief or mild interest can now obtain detailed, subjective, 10,000 word computerized astrological reports from Time Pattern Research Institute, Inc., Valley Stream, N.Y.

The Institute claims that its service represents a break-through not only in computers but also in astrological methods. A machine can check theory in one day that a skilled astrologer would require twenty years to accomplish. The computer sifts over 18 million pieces of information to produce each report and is theoretically programmed to produce as many as two billion different reports.

60 Second Horoscopes

Katina Theodosiou, director of research for the Institute, said limitless studies can now be made of the incidence of correlate astrological configuration as it relates to psychological problems such as alcoholism, drug addiction, suicide and autism. Also, studies can be made in directions such

as ratios of intelligence, and superior intellectual and artistic endowments.

The Institute uses an IBM/360 to produce a report every minute - work that formerly required as much as a full week of computation, analysis and interpretation by an astrologer. The 20-page report provides in-depth character analysis, forecast of future activities, prospects and possibilities and guides for future action that touch on almost every aspect of an individual's life.

18 Million Pieces of Information

The computer sifts over 18 million pieces of information stored in its memory bank and correlates them with an infinite number of variables based on exact positions and configurations of the sun, moon and planets in the solar system, projected backward 80 years; complex statistical formulae; the exact time to the minute, and location of an individual's birth; plus the interpretive skills of an astrologer.

The Institute charges \$15 for a report. Charts created by astrologers, without the use of computers, run from \$5 to \$500.

Air Force Selects 360/40s For AFLC

HANSCOM FIELD, MASS. - The Air Force selected IBM to install replacement electronic data processing equipment at Air Force Logistics Command Headquarters and five Air Materiel Areas. 256K 360/40 IBM Systems will replace the 1401/1301 systems presently in use.

IBM was selected from 13 firms invited to submit proposals by Electronic Systems Division's (ESD) Electronic Data Processing Equipment Office headed by Col. Sylvester P. Steffes. Acquisition of the equipment

will be through a General Services Administration contract.

The equipment, scheduled for delivery in August or September, will support base stock control and distribution functions at Logistics Command Headquarters, Wright-Patterson Air Force Base, Ohio; and Air Materiel Areas at Tinker Air Force Base, Oklahoma; McClellan Air Force Base, Calif.; Warner Robins Air Force Base, Ga.; Kelly Air Force Base, Texas; and Hill Air Force Base, Utah.

1968 Query: To Buy, Or Not To Buy

New York, N.Y. - The first annual Brandon Management Conference was effectively concentrated in two areas: showing the data processing executives that they were, in fact, on the right track even though they had some doubts themselves; and demonstrating that it was important to pay close attention to the financial possibilities of an EDP system. Dick Brandon, acting as moderator, went so far as to say, "I have never known any single case where purchasing the system was not justified." Other speakers, while not quite so forthright, still had to go to far-out examples to find purchases which might not be justified - like the Olympic Committee that required a computer for one single week.

Testing the I. Q. Test

The idea of confirming the EDP managers in their own feelings was perhaps best exemplified by Mr. Robert Reinstedt's discussion (Mr. Reinstedt is a research psychologist at the Rand Corporation). His point was that EDP managers, themselves, were the best people to decide how things were going. He stated that the results of tests on tests - that is, checking how people actually behaved by comparison with the way the tests indicated that they were supposed to behave - found supervisors much better at making judgments than the standard I.Q. tests!

Scholarship achievements, publications, recognition by peers and other parameters based on actual performance were also superior criteria.

He ended by saying that insofar as personnel selection is concerned, managers should put more faith in their own good judgment - and less emphasis on tests.

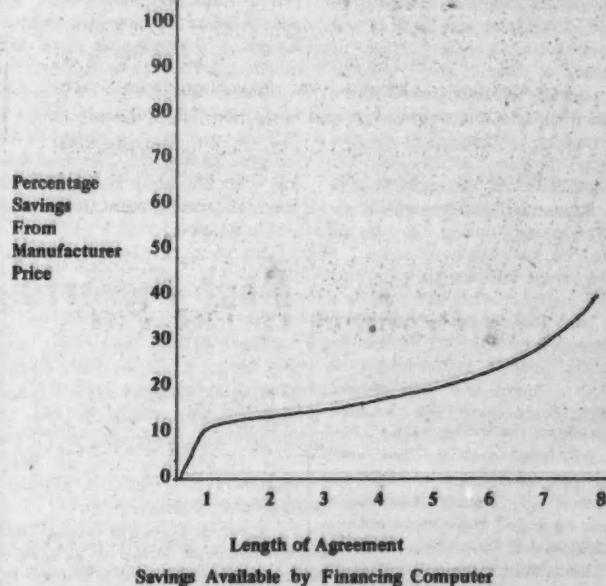
Rule of Thumb on Savings

Mr. Roland Eppley of Commercial Credit Computer Corporation, stressed the decreasing movement of renting computers from manufacturers. Regarding this as a sign of the growing self-confidence of EDP man-

agers, he said that the need to exploit specific capabilities should be balanced with the optimum financial arrangements so as to get the maximum productivity per dollar expended. He gave rules of thumb in his talk as to what savings could be made with various rents or leases. (See chart.)

Other speakers included Congressman Cornelius Gallagher (N.J.); Dr. Morris Rubinfeld of Pennsylvania Re-

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	SAMPLE2	106490	106860	107520	107760			
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Computer Learning Co Enters Education Area

Falls Church, Va. - Four computer executives from Control Data Corporation and Planning Research Corporation have resigned from their management positions to form a new company specializing in computer education and training, Computer Learning Corporation. They are:

Thomas E. Stone, a former CDC vice president, will serve as president of the new company. Swen A. Larsen, who established and was president of Control Data Institutes in the United States and Europe, and also headed Automation Institutes of America, a chain of some 50 computer schools across the United States; Robert F. McIntosh, a former general manager, Management Control Systems Division of Planning Research Corp.; and William C. Thompson, former regional manager of applications analysis for PRC are the other three involved.

Mr. Stone said in a statement that the new organization will provide a full range of computer education and training programs for three major areas of need in the computer industry: young men and women looking for a career; the computer professional trying to keep posted on the latest software and hardware applications/techniques; and the executive and manager who wants to learn practical applications of computers and data processing.

This facility will have a computer lab consisting of two fully equipped computer systems, one of which will be an IBM 360/30, thus providing the students with ample direct access to the computers. In addition to the computer lab, the facility will include an electronic lab.

The combined experience and familiarity with the computer world by Computer Learning's management and staff will provide the opportunity to design advanced courses for specialized personnel, specialized executive and management level training programs and specialized courses under contract to government and industry. CLC said, "the computer is only now beginning to spread its wings into all areas of business, govern-

ment, science and education. Its effect on our every day life is only beginning, and nearly everyone will become familiar with its possibilities and its limitations. Computer Learning aims to be the leader in providing a computer education to all levels of men and women".

The plans call for the opening of 12 wholly-owned education centers in metropolitan areas throughout the world, over the next three years. Each Education Center will offer courses to men and women interested in a computer career as a programmer, computer operator or computer technician. In addition, advanced courses for professionals in the computer business today, covering specific topics such as time sharing, communications and graphic displays, and management level courses will be offered.

Most Powerful System In UK Goes To London U.

The University of London, London, England, has ordered a Control Data 6600 computer system. Scheduled for delivery late in 1968, the multi-million dollar system will provide the university with the largest and most powerful data processing system in England.

The new 6600 will furnish a central computer service to all areas of the university for use in research and teaching, and will be installed in a new building. Initially, two satellite computers, small scale Control Data 1700's, will communicate with the 6600 over special data links. One 1700 will serve Imperial College, and the other will serve Kings College, and the London School of Economics.

The Coventry Economic, an English building society, will install a Honeywell 120 computer system next year. Coventry will offer the program it develops to other building societies in England that can use the software aid.

State Farm Life Insurance Co. has installed an RCA Spectra 70/45 computer system in its Bloomington,

EDPeople Moshman To Leasco's Software Div.

Allen Guggenheim has joined Computer Sciences Corp. as assistant manager of the Applied Sciences Department of the company's Southwest Operations. He comes to CSC from Data Dynamics, Inc.

Charles F. Jannasch has been named manager of applied systems for Honeywell EDP.

F. Michael O'Brien has been appointed assistant to the president of ITT Data Services, New York.

Gene F. Leonard has been named director of market planning and new production development for the same division of ITT.

Eugene E. Berg has been named general manager, Northern European Group in Sperry Rand Corp.'s Univac International Division. He will be headquartered in London.

Stanley Prather has been appointed director of information systems at the Kansas City headquarters of Thompson-Hayward Chemical Co.

Dr. Jack Moshman has been named vice president of Leasco Systems and Research Corp., Bethesda, Md. systems and software division of Leasco Data Processing Equipment Corp. Dr. Moshman was formerly managing director, management sciences for EBS Management Consultants, Inc.

Gary G. Van Winkle has been elected vice president and director for Philip C. Pipher Associates, Inc. Consulting and Data Processing Services, Washington, D.C.

George K. Trautwein, Jr. has been named district manager of Sperry Rand Univac Federal Systems Division's defense and marketing systems office at San Bernardino, Calif.

Rodney B. Murray has been named national sales manager of California Computer Products, Inc., Anaheim.

Sol Freedman has been elected vice president, corporate development and a director of Computer Power International Corp., New York.

Warren Wilson has joined Data Processing Financial & General Corp. (DPF&G), New York, as vice president. Also at DPF&G, Richard Ketover has been appointed a vice president.

John G. Hoyle has been appointed director of systems for Ransom Computer Sciences, Bethesda, Md.

Raymond R. Bolduc has been appointed advanced systems development manager for industry marketing at Honeywell EDP.

Leo F. Slattery has been appointed director of research and development for Autocon Industries, Inc., a subsidiary of Control Data Corp.

Edward Majewski has been appointed Boston Branch Manager by Optical Scanning Corp.

John J. Jamison has been appointed an advanced systems development manager for industry marketing at Honeywell EDP.

George P. Clark Advertising, Inc. has been named as advertising agency for Communitytype Corporation.

Ed Farris, national sales manager for Electronic Memories, Inc., has been given the additional responsibility of managing the company's international sales organization.

Orders and Installations

Ill. offices. The computer will be the nucleus of a proposed large-scale communications network linking the company's 21 regional offices.

CAE Industries Ltd., Montreal-based manufacturer of sophisticated flight simulators, has ordered five Sigma 2 computers valued at over

\$1 million. Four of the computers will be used to control flight simulators such as those that duplicate characteristics of the Douglas DC-8-62 ultra-long range jetliner and the Boeing 747 jumbo jet. The other will be integrated into a CAE system designed to monitor and control crude oil production at Getty Oil Co.'s Bakersfield oil fields.

Bethlehem Steel Corp., Bethlehem, Pa. has ordered a Univac 494 Real-Time computer system. Delivery of the system, which will augment an existing Univac 490 system, is scheduled for June, 1968.

Behind The Privacy Issue

What Is A Statistical Data Base?

The problem in defining the National Data Bank issue is compounded by the fact that few people know what the Bureau of the Budget is trying to initiate, or, for that matter, what presently exists. The main fear is of a "dossier" style data bank - which the Bureau insists it is not interested in founding! The Bureau says that it wants a Federal Statistical Data Base - one that will never give out any type of information on a given or identifiable individual.

Not the Identity

To see how such a Base would operate it is only necessary to look at the present operations of the Census Bureau. They already have large files,

PROGRAMMER

Excellent opportunity with progressive bank data processing organization in central Maine. Requirements: Education - B.A. degree or equivalent business experience. Experience: 1 year programming, 3rd generation equipment. Prefer commercial bank background and EDP experience on IBM 360/30 disk system, but this is not required. Please send resume and salary requirements to:

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gathered under the authority of Congress; and these are available for people to use for their own private purposes - with some qualifications.

These qualifications are: 1) that the Bureau regards the query as being in the public interest - or at least not against it; 2) that the expenses of the operation are paid for by the user; 3) that the Bureau has the right to publish this data six months later.

Like Census Bureau

The type of questions being answered by the Bureau concern the population by profession, age and where they live. If you want to know how many 48-year-old doctors live in New York they will tell you - as they will in Chicago, Houston or any other large city. But not for little Maintown, which only has two doctors. There the information would allow the age and identity of the doctors to be revealed to the town's population - and that the Bureau is not allowed, or prepared to do.

You can go further. A magazine can bring its list of subscribers to the Bureau, and have them work out a profile, based on profession, age, etc. This is in demand by the potential advertiser - and, at present, help can be obtained from the Bureau. But still the rule remains - nothing that might be used to identify an individual is permissible.

Stymied

That is the current state of affairs; the type of operation the Bureau of the Budget regards as being a "Statistical Base". This system is presently at an almost complete standstill while the Bureau tries to find out if there is any way of satisfying their needs as well as the requirements of Congress. As yet they are not certain as to whether they should try again. In the meantime, the very minor start toward a National Data Base - or a Federal Statistical Base as it might more properly be called - is stymied.

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EDP Markets Continue Their Boom — Honeywell Breaks A Billion As C&S Makes Its First Million

All over the computing industry success is breaking records — from old established firms like Honeywell to 3-year-old consultants just breaking the \$1,000,000 a year earnings barrier.

Accelerated sales in the second half of the year gave Honeywell its first billion dollar year. Board chairman James H. Binger estimated the company's worldwide sales at \$1,044 million, up 14% over 1966 sales of \$914 million.

Although he did not report earnings, Mr. Binger said there was an

improvement in the fourth quarter earnings, when the effect of the mid-year discontinuance of sale-and-leaseback of computers is considered. The improvement was slightly less than enough to offset the \$.14 earnings per share contributed by sale-and-leaseback in the fourth quarter of 1966, he said.

Norman E. Friedmann, president of Computing and Software, reported net income for the company in the past twelve months reached an all time high of \$1,007,000, an increase of 96% over the \$514,000 reported 1966. Earnings per share were equal to \$.89, nearly doubling restated 1966 earnings of \$.47 a share.

Total sales in 1967 amounted to \$21,189,000, an increase of 37% over restated 1966 sales of \$15,466,000.

Moore Expands in South

DENTON, TEXAS — Moore Business Forms, Inc., will build a new, Southern Division administration building here to be ready for occupancy by November 1968.

Saving EDP \$\$ With 360/25 — Part II

Keeping Control Of A 360/25 Order

by Alan Taylor

The day after IBM announced the 360/25, I had lunch with the former director of management information systems of a very large corporation. Looking out from the restaurant at the top of the Prudential Building in Boston, looking out over historic Bunker Hill, he told me about his experiences with many different computer installations; in keeping many different computer installations in order; and operating on schedule. He had found no real difficulties, so, naturally I asked him what his secret was.

"Negotiation," he replied. "Just skill in negotiation. This is what skilled EDP people seem to have."

As it turned out, he constantly maintained a second source of supply. When he had 360s in, for instance, he obtained contracts from RCA guaranteeing to replace the 360s with

Spectra 70/45s within a short period of time after issuing a purchase order. Then, when serious difficulties arose, and software problems (which in his opinion were not his concern) were leading to delays in his installations, he simply called the appropriate person at IBM and told him that he had 30 days to get matters right.

"I don't want to hear," he would say, "that my people aren't good enough. You knew who my people were when you came in. It's too late now. Either see that my systems are working in the way they are supposed to be, or in 30 days I'll guarantee you there will be an order out to RCA to replace them and your machines will be out."

He told me that he got plenty of support.

He had mentioned that he contacted the appropriate person at IBM. I asked him what he meant, and he said, "You don't go to your salesman or to his immediate boss, but one above that. Then you get results."

This tactic had a familiar ring, although generally I had seen it from the other side of the desk! The technique of jumping two management levels has been used on a number of occasions by EDP salesmen wanting to get a reconsideration of their turned-down proposals. Jumping the second level involves the use of a senior person or at least his title, but usually gets sufficient attention to get a rehearsing; if only to educate the top man as to why the original decision had been made. Normally, he does not have the right data to know the reasons himself.

2nd Supplier Possible.
There are a number of companies that can help you keep control of the situation in this way. If you are moving from a 1400 you can look to Honeywell, or RCA, or — if you are using RPG — Univac. Later, if you have converted to actual 360 native code, or alternatively to a mixture of 360 and 1400, your potential alternatives are somewhat limited to RCA, unless you have compiler language compatibility.

Compiler language is the obvious,

desirable and most difficult to obtain method of maintaining control of the situation in your own computer room. Indeed, Cobol was designed specifically for that purpose.

Unfortunately, most compilers — including Cobol — also include additional extras put in by the manufacturers. These act as marketing adjustments to buyers and are very welcome for this reason. However, they also act as lock-ins which prevent a program running on another system. The compilers on the 360/25 are no exception and full use of them makes it difficult to move to another computer manufacturer's systems.

However, a restricted use of them can be made. For instance, if the main programs are written simply, not using some of the more infrequent and complicated statements, you can obtain a good and compatible language. In fact, you will suffer little, if any, object-time-deficiency through this because one of the first things almost any compiler does is to break down those nice complicated statements into a series of small simple ones. By writing simple statements in the first place, you pre-digest the program for the compiler.

Summary

In summary, to keep control of the situation in your 360/25 computer room you may want to: 1) maintain relations with an alternative supplier during the initial installation, emulation and native 360 language areas; 2) write all programs so that they are not locked into the particular system you are currently using.

Last week we discussed methods of saving EDP dollars with the 360/25 which basically involved using that system in place of its more expensive brother, the 360/30. Some computer systems will be able to use this, some will not. Equally, some will be able to use the methods of control suggested here, and some will not. For those who cannot, there are still other ways of saving EDP dollars while still using the 360/25 and we will be talking about some of them next week when we discuss "Is That Hardware Really Necessary?"

Latest Status Report On Non-IBM Disk-Packs

NON-IBM DISK PACK MANUFACTURERS

Manufacturers	Style of Packs	Pricing	Deliveries		Comments
			Time	Where	
Memorex Corp.	1316	as IBM	From Stock	Worldwide	Tape experience; also selling disk drives.
Control Data	1316	as IBM	Not Quoted	—	Computer manufacturer tooling up for disk production.
Univac	1316	as IBM	Not Quoted	—	Computer manufacturer with tape exp.
Mac Panel	1316	as IBM	2 months	Worldwide	Tape experience.
Thin Films	1316	as IBM	From Stock	USA	Plated packs. Background in disk field.
Caelus Memories	1316	as IBM	From Stock	Key USA Areas	A new firm for disk pack production.
Honeywell, Inc.	1316	as IBM	?	USA	Computer firm with IBM compatible computer systems.

The New Honeywell Disk Pack Production Line Shown In Use



These views of the disk pack production facility in Newton, Mass. show (left) the disks themselves being given a cleaning in a hot acid solvent; then (center) after being coated with magnetic oxide, being tested to check that the spacing is uniform. The finished product is finally tested on a computer system (right).

Al Flack Saves \$100,000/yr. - And Pays His Programmers More!

Three years ago the Charter Company of Jacksonville, Florida was spending \$250,000 a year on data processing. Now they are only spending \$150,000 ... and soon intend to make it zero!

Here is how they are doing it - first in the original words of Mr. Albert Flack, their data processing manager, then through his answers to COMPUTERWORLD's questions.

"First, we examined the staff situation and came to the conclusion that streamlining was strongly indicated. We decided the best approach was to have an extremely strong technical staff and reduce our operations sections. Next, new systems were created and existing systems were modified to improve locking up computer operations and reducing our re-run times.

"Next on the agenda was the forms problems. Here we decided to have all internal reports run on stock paper instead of custom forms. Then we examined the reports being generated to determine if the frequency was too high and if all copies were being utilized. We soon discovered that once a department becomes accustomed to receiving many copies of reports they are reluctant to relinquish these copies. (Remember - the cost of stock paper is incremented in excess of 12 times for six part paper.) So nip this problem in the



Al Flack

bad prior to commencement of the system.

"We moved to another area of concern - the control group in the data center. We decided to have the computer function as the control system, thereby eliminating the control clerk.

"But the road to economy became rockier. In order to save money, we had to spend money. The computer we were using was inadequate. However, after much

deliberation and careful screening of vendors we decided to change computer systems. This enabled us to further improve our operations and actually start a new business - offering computer services.

"This company has experienced two computer conversions. The cost of the initial conversion was more than \$125,000. We estimated that the second conversion to the new computer system would not exceed \$10,000 but we happily discovered that this conversion cost less than \$5,000. Nor was service interrupted.

"Within this cost framework were such items as shipping of computers and unit record equipment, housing for the computer and overtime. Again, happily, we did not have an overlap of computers and escaped rentals for a four day period. We attribute the reason for this to a non-parallel conversion. This decision was based on the computers control of the system and because of our staffing. We had decided that it would be more practical and effective to place all emphasis on the new system rather than attempting to fully audit the old and new systems and accounting for system differences.

"And now where do we go?

"Our first goal is to have equipment rentals offset by outside service



Personal Page

income. This we expect to accomplish in mid-1968.

"Secondly, we have established a five-year plan. Under this plan, we expect to completely eliminate our company data processing cost through income from outside services. Impossible, you say? We don't think so. After all, three years ago there were some who said it was impossible to reduce our data center costs in excess of \$100,000 a year. But, we did.

"Before we undertook this cost

analysis and reduction program, our data processing costs were in excess of \$250,000 a year. Our work consisted of servicing of 24,000 mortgage loan accounts and general ledger for approximately ten companies.

"Today we have what we consider to be one of the best mortgage servicing systems in the nation - from lock box to computer controlled bank balances. We fully service an insurance agency with a premium volume of more than \$875,000. This is a total system from invoice preparation to commission statements. We have also managed to find time to process inventory controls, profitability reports, general ledger, payroll, gas well distribution and accounts receivables.

Flack Talks To Computerworld

That was Mr. Flack's own story. While interesting, it did seem to omit some important details, so we asked him some specific questions. Here they are, together with Mr. Flack's answers.

Q. Mr. Flack, you mentioned two conversions - one at \$125,000 and one costing \$5,000. There seems to be a big difference between these figures. Would you give us the details?

A. The first conversion was from manual operations - not even EAM. The second conversion was from the IBM 1401 to a Honeywell 200. The \$5,000 figure included the cost of shipping the computers to and from the factories, overtime involved, and various sundries. It does not include the standard work which our staff was handling.

Q. Even so, the figure seems low. How did you handle the conversion through the Liberator programs?

A. No. We re-programmed our system, using the same formats so that we could easily test out the operations. Honeywell gave us 30 days free use of the system before putting it on rental - and before that period was up we were able to ship the IBM system out.

Q. You had an IBM 1401. Why did you not go to a 360/30?

A. Actually we had a 360/30 on order, and there were two reasons why we changed vendors. One naturally, was the price - the Honeywell system is considerably cheaper than the one that IBM proposed. The other was because we did not want to be a pioneer - and we would have been the first 360 in the area.

Q. Where did the major part of your savings come from?

A. Staff reductions. We had about twenty people on the staff two years ago - and now we have twelve. We pay them more, but still the payroll costs are well down.

SEL Reduces Prices

FORT LAUDERDALE, FLA. - Systems Engineering Laboratories will reduce prices on its SEL 810A, SEL 840A and SEL 840MP computers, effective February 1, 1968.

Sales Manager Dallas L. Talley said current deliveries of the SEL 810A and SEL 840A will continue to be 45 days after receipt of order. Price reductions on the computers and peripherals range from 10% to 20% on typical configurations.

Adapso Appeals Decision

continued from page 1

vide the Association with the opportunity to try the case on its merit."

The court sustained a dismissal motion by the defendants, the Comp-

troller of the Currency and American National Bank and Trust Co. of St. Paul, on the ground that ADAPSO didn't have the "legal standing" to

sue, according to a spokesman for the comptroller's office.

The association had sought an injunction to restrain the bank from providing data processing services allowed by the comptroller's ruling. The comptroller's spokesman said the ruling was made because banks were acquiring expensive equipment which they were only able to use a part of the time. Offering data processing services to other customers and banks was the only way to make profitable use of the equipment.

The comptroller is still defending a ruling that allows national banks to act as travel agents for customers. The comptroller's office is seeking a dismissal of a suit brought by an association of travel agents. The suit is an attempt to bar banks from acting as travel agents.

Comptroller of the Currency James J. Saxon made both rulings. He has since been succeeded by William B. Camp.

Calendar

Jan. 17-18, Chicago - American Society for Cybernetics: Cybernetics Symposium and Business Meeting. Contact: G.T. Jacobi, II Research Institute, 10 West 35th St., Chicago, Ill.

Jan. 18-19, Tampa, Fla. - First Annual Simulation Symposium. Contact: Ira M. Kay, Registrar, P.O. Box 1155, Tampa, Fla. 33601.

Feb. 22-23, New Orleans, La. - Assn. of Data Processing Service Organization Management Conference. Contact: Jerome L. Dreyer, Automatic Data Processing, Inc., 1040 Highway 46, Clifton, N.J. 07013.

Mar. 12-15, Philadelphia, Pa. - Joint Spring Conference of the Univac Users Association and the Univac Scientific Exchange. Benjamin Franklin Hotel. Contact: UUA - George Popp, Harris Trust and Savings Bank, 111 West Monroe St., Chicago, Ill. 60690, or USE - Harry Rayner, Univac, P.O., Box 8100, Philadelphia, Pa. 19101.

Mar. 14-16, Houston - Sixth Annual Symposium on Bio-Mathematics and Computer Science in the Life Sciences. Contact: Office of the Dean, U. of Texas Graduate School of Biomedical Sciences, Division of Continuing Education, P.O. Box 20367, Houston, Texas 77025.

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Brandon Seminar

continued from page 3

search Associates, discussing hardware and future systems; and Mr. John Postley, vice president of Advanced Information Systems, Informatics Corporation, discussing the advances in proprietary software during the past year or so.

At the end of the conference, a number of attendees commented on how they thought it had been a "breath of fresh air." Apparently they had learned little new, but felt that the increased confidence they had in their own views was most valuable to them. Some dissent on exactly the same point - that they had learned little new - was also voiced, but in general it appeared that there would be a second annual Brandon Management Conference. It had been a useful look ahead - as billed.

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FINANCIAL MATTERS

ARMONK, N.Y. - International Business Machines Corporation has announced its preliminary results for 1967. Thomas J. Watson, Jr., chairman of the board, reported that IBM worldwide consolidated net earnings after taxes for the year ended December 31, 1967, amounted to \$651,499,558 or \$11.61 a share on the 56,114,279 shares outstanding December 31, 1967. This compares with net earnings after taxes for the year 1966 of \$526,130,192, equal to \$9.43 a share earned on the 55,809,405 shares outstanding December 31, 1966, adjusted for the 2 1/4% stock dividend paid June 10, 1967.

Net earnings before taxes amounted to \$1,297,499,558, compared with \$1,054,130,192 in 1966.

Consolidated gross income for 1967 amounted to \$5,345,290,993, compared with \$4,247,706,091 in 1966.

Mr. Watson noted that these financial results reflect the continuing high level of business volume of the company's System/360 data processing line, as well as a very substantially increased level of outright sales of this equipment during the last six months of the year. He asked the stockholders to recognize the fact that outright sales have the effect of realizing income currently which, on a rental basis, would be realized in future periods. Changes in the level of these sales can result in significant fluctuations in income from year to year and even wider fluctuations from quarter to quarter.

FORT LAUDERDALE, FLA. - Systems Engineering Laboratories reported sales of \$5,539,000 for the 24 weeks ended December 15, 1967, and net income of \$421,000 or \$.43 a share. For the like period in 1966, the company reported sales of \$2,745,000 and net income of \$82,200 or \$.09 a share. In fiscal year 1967 ended June 30, 1967, the company had sales of \$8,027,000 and net income of \$304,000 or \$.32 a share.

BEDFORD, MASS. - EG&G, Inc. has completed the acquisition of Wolf Research and Development Corp. The transaction involved an undisclosed amount of EG&G common stock in exchange for all the outstanding stock of Wolf Research and Development. Wolf will operate as a wholly-owned subsidiary of EG&G.

WYNNEWOOD, PA. - Standard Computers, Inc. has received a \$25 million line of senior credit from a group of nine banks headed by the Continental Illinois National Bank & Trust Co., Chicago. SCI president Herman Affel said the firm will use the additional funds to step up its EDP leasing activities. Terms of the financing call for an interest rate 1 1/4% higher than the prime rate, with the interest varying according to prime rate fluctuations, he noted.

Computer Stocks: Trading Summary

Week Ending January 12, 1968

1967	1967	1967	1967	1967	1967	1967	1967	1967	1967
High	Low	High	Low	High	Low	High	Low	High	Low
Addressograph-Multigraph	80 1/2	46 7/8	77 7/8	72 5/8	76	- 1	- 1.30		
Amper Research	195	37 3/4	170 5/8	167 1/2	162 1/4	- 4 3/4	- 2.84		
Amper Corp.	40 3/4	22 3/4	36	34 1/4	34 5/8	- 5/8	- 1.77		
Burroughs	192	80 7/8	189	175	188 3/4	+10 1/2	+ 5.96		
Collins Radio	114 7/8	53	94 5/8	88 1/8	89 3/4	- 5 1/4	- 5.53		
Control Data	165 5/8	55 1/2	143 1/4	130 3/4	138 1/2	+ 3 7/8	+ 2.88		
Electronic Associates	30 1/4	16 3/4	24 1/8	22 1/8	22 1/8	- 1	- 4.32		
General Electric	115 7/8	82 1/2	100	94 5/8	95 3/8	- 5/8	- 0.65		
Honeywell	117 7/8	65 1/2	103 3/4	99 1/8	100 3/8	+ 1/2	+ 0.50		
IBM	648	362 1/2	630 1/2	594	616	+22	+ 3.88		
Litton	120 3/8	79 1/2	100 3/4	98 3/4	90	- 1 7/8	- 1.90		
Met Cash Register	138 5/8	67 1/8	122 1/2	118	119 3/4	- 1/4	- 0.22		
RCA	65 1/2	42 5/8	55 1/8	50	52 5/8	+ 1 1/2	+ 2.83		
Raytheon	117	68	104	97 1/2	98 1/4	- 5 1/8	- 4.96		
Sendera	77 1/4	37 5/8	61	56 1/2	59 3/4	- 1/8	- 0.19		
Scientific Data	152 3/4	70 3/8	136 3/4	125	126	+ 4	+ 3.03		
SCM	82 1/4	43 1/2	36 7/8	34 1/8	35 3/8	- 3/4	- 1.33		
Sperdy Rand	65 1/8	38 1/8	57	52 1/2	54 7/8	- 3/4	- 1.35		
NYSE COMPUTER STOCK AVERAGE						+ 1.17	- 0.39		

1967	1967	1967	1967	1967	1967	1967	1967	1967	1967
High	Low	High	Low	High	Low	High	Low	High	Low
Audio Devices, Inc.	30 3/8	20	28 5/8	26 7/8	28 1/4	+ 1 5/8	+ 6.10		
Automatic Data Processing	68 1/2	41 1/2	59 5/8	55 1/4	57 1/2	- 1/8	- 0.22		
Calcomp	46 3/4	34	43 3/8	40 1/4	43 1/8	+ 1 5/8	+ 3.92		
Computer Applications	47 3/8	14	40 5/8	36	38	- 1/8	- 0.33		
Computer Sciences	67 5/8	18	55 3/8	51 3/4	53 3/8	- 3/4	- 1.38		
Digital Equipment Corp.	156	29 3/8	126 1/2	115 1/4	122	- 2 1/4	- 1.81		
GC Computer Corp.	41	23 1/4	33 3/4	30 3/8	32 3/8	+ 1 3/4	+ 7.66		
Leasco	138 3/4	33 5/8	130	115 1/8	128	+10	+ 8.47		
Levin-Townsend Computer Corp.	77	10 7/8	69 5/8	62 1/4	66 7/8	+ 1 5/8	+ 2.49		
Milgo Electronics	19 5/8	5 1/8	19 5/8	15	19 1/8	+ 2	+11.68		
Norfolk Data Sciences	198 1/2	187	165 1/4	157	158	- 4 1/4	- 2.62		
Planning Research	51	27 5/8	42 1/2	36 5/8	41 1/8	+ 2 1/8	+ 5.45		
Potter Instrument	40 1/2	12 3/8	35 7/8	32 7/8	32 3/4	- 1/4	- 6.43		
Randolph Computer Corp.	55 3/4	32 1/4	49 7/8	43 1/2	49	+ 1/2	+ 1.01		
AMEX COMPUTER STOCK AVERAGE						+ 0.79	+ 2.43		

1967	1967	1967	1967	1967	1967	1967	1967	1967	1967
High	Low	High	Low	High	Low	High	Low	High	Low
Applied Data Research	30	2 1/8	28	24 1/2	20 1/2	+ 7 1/2	+36.59		
Bolt, Beranek & Newman, Inc.	30	8 1/4	23 1/2	24 1/2	23 1/2	- 2	- 7.84		
Computer Usage	72	20 1/4	54	56	59	- 5	- 8.47		
Cyber-Tronics	19	4 3/4	18 3/4	19 1/4	17 5/8	+ 1 1/8	+ 6.38		
Data Products	23 1/8	2 1/2	18 3/4	19 1/4	18 7/8	- 1/8	- 0.66		
Digital Equipment Corp.	24 1/2	6	24 1/2	23 1/4	21 1/2	+ 3	+13.93		
DPA, Inc.	16 1/4	4 1/4	14 1/2	15	14 3/4	- 1/4	- 1.89		
Electronic Numerics	57 1/2	12 3/4	56	57	49 1/4	+ 6 3/4	+ 1.37		
Fabrit-Tek	15 3/4	6	12 1/8	12 5/8	13	- 7/8	- 6.73		
LNC Data, Inc.	15 3/4	7 5/8	12 3/4	13 1/4	13	- 1/4	- 1.92		
Management Assistance	24 3/8	10 1/8	15 3/8	16 1/8	15 1/4	+ 1/8	+ 0.82		
Numerics	226	63	200	203	177	+25	+12.99		
Optical Scanning Corp.	102	25 3/4	87	89	85 1/2	+ 1 1/2	+ 1.73		
Recognition Equipment Corp.	191	48 1/2	189	191	165	+26	+12.50		
Systems Engineering Labs	63 1/4	8 7/8	60	61 1/2	59	+ 5	+ 9.09		
University Computing Co.	95	72	80	82	79	+ 1	+ 1.27		

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Hospital Turns On - 2nd Phase In April

WEEHAWKEN, N.J. - North Hudson Hospital has installed a General Electric 115 computer system valued at \$70,000. The system will be used to cut costs of hospital administration and to aid in analyzing medical records.

The system includes 8K memory, a 300 lines per minute printer, a 300 cards per minute card reader, and a 200 cards per-minute punch.

Second Phase by April

First applications for the system are for payroll and accounts payable. By April 1 it will be used for handling accounts receivable and billing, followed by general ledger and financial statements.

Computerized discharge diagnosis and Medicare administration will be placed on the computer later this year. It is estimated that information which used to take half a day of manual processing can be processed in about five minutes.

Snowballing Paper Work

The new system will make it possible for the hospital staff to keep pace with snowballing paper work resulting from expansion of hospital services and Medicare. At the same time, it will aid in further expansions of hospital operations as the system can be expanded substantially by adding new peripheral equipment.

New Saxon Book Published - Programming The System/360

The System 360 Programming A Self-Instructional Manual, James A. Saxon, Englehard & Englehard, \$5.75, Prentice Hall.

Exactly what "Programming" is I do not know, nor is the exact meaning of implications well defined.

The System 360 Programming introduction informs people that a study of the book will not, in itself, develop "expert computer programmers." Personally, I read into this the implication that it will, however, enable a reader to develop into a reasonable computer programmer. Such a statement would not be true. The book will allow some - not many - people to get a hold on an inferior method of learning the coding for the System 360. It is simply a detailed discussion of the instruction code, and appears to have been written between the period 1964 - 1966, although it has just been published. The audience to which it is addressed is not obvious, and in general a better discussion for 360 programming can be obtained from standard IBM manuals.

The System 360 Programming consists of ten each of the number of

Book Review

separate lessons and four appendices. There is also a one page introduction. The units give a fair and concise description of the machine code of the main line system 360. At the end of each unit are two or three questions with space to write in answers. Occasionally, incorrect solutions as well as possible solutions are given, but in many cases the student will not be able to identify his answers with either the correct or the incorrect solutions, and will not receive clear guidance as to whether or not he has properly completed the answers. The last unit contains details of the operating system 360 assembler, excluding macros, I/O, and other standard operations. No index is provided.

Solution To 360/67 Performance Tested

PITTSBURGH, PA. - The Carnegie Institute of Technology is testing out a potential solution to the problem posed by the poor performance of the IBM 360/67 Time Sharing System.

The solution concerned is to replace the drum with the IBM 8 users mass core storage. Simulations have shown that the bulk core can: 1) support the maximum paging rate without high system costs; 2) does not withdraw portions of memory from the usable main memory of the system. It also allows an added advantage in that not all pages need be swapped. Those which are not heavily used may be referenced directly by the central processor.

It is hoped that by operating selectively the Carnegie Institute of Technology will improve its performance by almost an order of magnitude.

The proposed solutions, if successful, will be one of the cases where two problems may be solved simultaneously. The bulk core storage introduced by IBM in 1964, and the 360/67, introduced in 1965, have both had a major problem in finding a niche.

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